AMENDMENTS TO THE CLAIMS

Claims 1-47 (Cancelled)

48. (Original) A method for forming an endodontic instrument comprising:

removing material having a first hardness from an instrument blank by a method selected from the group consisting of electrical discharge machining, wire electrical discharge machining, electrical discharge grinding and electrochemical machining to form a plurality of flutes having a non-directional surface finish,

wherein at least about 25% of the diameter of the instrument blank is removed at a point of maximum metal removal, and

redepositing at least a portion of the removed material on the flutes being formed to form a recast layer having a second hardness of at least about 15% greater than the first hardness.

49. (Original) The method of claim 48 further comprising forming the instrument blank from a wire of the material to a pre-determined cross-sectional shape by a method selected from the group consisting of electrical discharge machining, wire electrical discharge machining, electrical discharge grinding and electrochemical machining.

50. (Original) The method of claim 48 further comprising twisting the instrument blank having the plurality of flutes to form a plurality of helical flutes.

51. (Original) The method of claim 48 wherein the material is a superelastic material.

52. (Original) The method of claim 51 wherein the superelastic material is a nickel-titanium alloy.

53. (Original) The method of claim 52 wherein the nickel-titanium alloy comprises at least about 40 at.% titanium.

54. (Original) The method of claim 53 wherein the nickel-titanium alloy further comprises an element selected from the group consisting of: niobium, copper, iron, chromium, cobalt, vanadium, hafnium and palladium.

55. (Original) The method of claim 48 wherein the material is stainless steel.

56. (Original) The method of claim 48 wherein the material is a steel alloy.

57. (Original) The method of claim 48 wherein removing material to form the plurality of flutes includes:

(a) rotating the instrument blank about it's center longitudinal axis while advancing the instrument blank past an electrode without direct contact to remove the material thereby forming a first of the plurality of flutes extending helically around the center longitudinal axis of the instrument blank, then

(b) rotatably indexing the instrument blank about the center longitudinal axis not more than 180 degrees and repeating step (a) thereby forming a second of the plurality of flutes extending helically around the center longitudinal axis of the instrument blank.

58. (Original) The method of claim 57 further comprising:

(c) repeating step (b) a desired number of times to form a desired number of flutes.

59. (Original) The method of claim 57 comprising holding the electrode stationary while advancing the instrument past the electrode.

60. (Original) The method of claim 57 comprising rotating the electrode while advancing the instrument past the electrode.

61. (Original) The method of claim 57 wherein the instrument blank is advanced past the electrode at a rate of between about .025 and about 4 inches per minute.

62. (Original) The method of claim 48 wherein removing material to form the plurality of flutes includes:

(a) holding the instrument blank stationary while advancing an electrode past the instrument blank without direct contact to remove the material thereby forming a first of the plurality of flutes extending non-helically along the center longitudinal axis of the instrument blank, then

(b) rotatably indexing the instrument blank about the center longitudinal axis not more than 180 degrees and repeating step (a) thereby forming a second of the plurality of flutes extending in axial alignment with the first of the plurality of flutes.

63. (Original) The method of claim 62 further comprising:

(c) repeating step (b) a desired number of times to form a desired number of flutes.

64. (Original) The method of claim 62 wherein the electrode is advanced past the instrument blank at a rate of between about 0.25 and about 4 inches per minute.

65. (Original) The method of claim 48 further comprising providing a surface pattern on the electrode whereby a reverse image of the surface pattern is produced on the instrument blank as the material is being removed.

66. (Original) A method for forming an endodontic instrument comprising the steps of:

forming a wire into an instrument blank of material initially having a first hardness;

forming a first helical flute in the instrument blank by a method selected from the group consisting of electrical discharge machining, wire electrical discharge machining, electrical discharge grinding and electrochemical machining, including rotating the instrument blank about it's center longitudinal axis while advancing the instrument blank axially past an electrode without direct contact with the instrument blank to remove material therefrom and thereby form the first helical flute therein, wherein at least about 25% of the diameter of the instrument blank is removed at a point of maximum metal removal, and to redeposit at least a portion of the removed material on the flute being formed to form a recast layer having a non-directional surface finish and a second hardness at least about 15% greater than the first hardness; and

rotatably indexing the instrument blank about the center longitudinal axis not more than 180 degrees and repeating the forming step to form a second helical flute having a non-directional surface finish and the second hardness at least about 15% greater than the first hardness.

67. (Original) The method of claim 66 further comprising repeating the indexing step a desired number of times to form a desired number of helical flutes.

68. (Original) The method of claim 66 wherein the instrument blank is formed from a wire of the material to a pre-determined cross-sectional shape by a method selected from the group consisting of electrical discharge machining, wire electrical discharge machining, electrical discharge grinding and electrochemical machining.

69. (Original) The method of claim 66 wherein the material is a superelastic material.

70. (Original) The method of claim 69 wherein the superelastic material is a nickel-titanium alloy.

71. (Original) The method of claim 70 wherein the nickel-titanium alloy comprises at least about 40 at.% titanium.

72. (Original) The method of claim 71 wherein the nickel-titanium alloy further comprises an element selected from the group consisting of: niobium, copper, iron, chromium, cobalt, vanadium, hafnium and palladium.

73. (Original) The method of claim 66 wherein the material is stainless steel.

74. (Original) The method of claim 66 wherein the material is a steel alloy.

75. (Original) The method of claim 66 comprising holding the electrode stationary while advancing the instrument past the electrode.

76. (Original) The method of claim 66 comprising rotating the electrode while advancing the instrument past the electrode.

77. (Original) The method of claim 66 wherein the instrument blank is advanced past the electrode at a rate of between about 0.25 and about 4 inches per minute.

78. (Original) The method of claim 66 further comprising providing a surface pattern on the electrode whereby a reverse image of the surface pattern is produced on the instrument blank as the material is being removed.

79. (Original) A method for forming an endodontic instrument comprising the steps of:

forming a wire into an instrument blank of material initially having a first hardness;

forming a first non-helical flute in the instrument blank by a method selected from the group consisting of electrical discharge machining, wire electrical discharge machining, electrical discharge grinding and electrochemical machining, including holding the instrument blank stationary about it's center longitudinal axis while advancing an electrode axially past the instrument blank without direct contact with the instrument blank to remove material therefrom and thereby form the first non-helical flute therein, wherein at least about 25% of the diameter of the instrument blank is removed at a point of maximum metal removal, and to redeposit at least a portion of the removed material on the flute being formed to form a recast layer having a non-directional surface finish and a second hardness at least about 15% greater than the first hardness; and

rotatably indexing the instrument blank about the center longitudinal axis not more than 180 degrees and repeating the forming step to form a second non-helical flute extending in axial alignment with the first non-helical flute, the second non-helical flute having a non-directional surface finish and a second hardness at least about 15% greater than the first hardness.

80. (Original) The method of claim 79 further comprising repeating the indexing step a desired number of times to form a desired number of non-helical flutes.

81. (Original) The method of claim 79 wherein the instrument blank is formed from a wire of the material to a pre-determined cross-sectional shape by a method selected from the group consisting of electrical discharge machining, wire electrical discharge machining, electrical discharge grinding and electrochemical machining.

82. (Original) The method of claim 79 wherein the material is a superelastic material.

83. (Original) The method of claim 82 wherein the superelastic material is a nickel-titanium alloy.

84. (Original) The method of claim 83 wherein the nickel-titanium alloy comprises at least about 40 at.% titanium.

85. (Original) The method of claim 84 wherein the nickel-titanium alloy further comprises niobium.

86. (Original) The method of claim 79 wherein the material is stainless steel.

87. (Original) The method of claim 79 wherein the material is a steel alloy.

88. (Original) The method of claim 79 wherein the electrode is advanced past the instrument blank at a rate of between about 0.25 and about 4 inches per minute.

89. (Original) The method of claim 79 further comprising providing a surface pattern on the electrode whereby a reverse image of the surface pattern is produced on the instrument blank as the material is being removed.